ENHANCED POSITION LOCATION REPORTING SYSTEM (EPLRS)

Army ACAT II Program

Total Number of Systems:	4,417
Total Program Cost (TY$):	$930M
Average Unit Cost – Radio (TY$):	$28K
Average Unit Cost–NCS (TY$)	$800K
Full-rate Production:	2QFY97

Prime Contractor

Hughes

SYSTEM DESCRIPTION & CONTRIBUTION TO JOINT VISION 2020

For successful implementation of the *Joint Vision 2020* operational concepts of *dominant maneuver*, *precision engagement*, *focused logistics,* and *full-dimensional protection*, enhanced command and control is essential. In anticipation of significant operational advantages, the Army recognizes that enhanced tactical communications is the first step towards achieving these goals. The Enhanced Position Location Reporting System (EPLRS) is a digital radio, and with its Net Control Station (NCS) comprises a network of individual radios that provide secure, electronic warfare resistant data communications primarily in support of the Army Battle Command System. Additionally, for the near term, EPLRS will play a vital role in the Army's modernization efforts as the communications backbone of the Tactical Internet, a critical component of the Digital Battlefield for brigade and below forces.

Major components of the EPLRS system are the EPLRS radio and NCS, which establishes and controls the network of individual radios. Each radio in the network has unique time slots during which it can transmit to both NCS and other radios. This capability is referred to as Time Division Multiple

Access, and allows NCS to process the transmissions of communications, as well as position, navigation, and identification services. The basic EPLRS radio consists of a receiver-transmitter, processor, and one of two interchangeable input/output devices. Each EPLRS radio is individually identifiable to NCS, and performs transmission (including relay), reception, and message processing functions for the situational awareness data base.

The current EPLRS system includes Very High Speed Integrated Circuit modules that increase the data rate to 56 kilobits per second (kbps) and a re-design of most of the remaining modules from the System Improvement Program (SIP). NCS has been downsized from a shelter on a 5-ton truck to a rigid-wall shelter on a High Mobility Multi-Purpose Wheeled Vehicle. The next generation of EPLRS, the Value Engineering Change Proposal, represents a departure from the MILSPEC design approach to better integrate commercial parts and practices and improve reliability while reducing cost. The new radio will be form, fit, and function compatible with the SIP version, but will reduce the current eleven circuit card assemblies to three and eliminate fifteen interconnections. It should also offer data rates in excess of 100 kbps (vs. 3.6 kbps for the SIP at IOT&E), increased network efficiency, and greater flexibility in setting up communication paths.

A typical EPLRS employment is in support of a brigade area that covers 20 by 30 kilometers, and includes approximately 170 EPLRS radios and one NCS. A division contains four of these "communities," one for each brigade and one for the division rear. The concept of employment for a brigade on the Digital Battlefield is over an area that covers 40 by 70 kilometers, and a battalion task force with brigade slice during a recent Digitization event was equipped with 158 EPLRS radios.

BACKGROUND INFORMATION

The origin of EPLRS can be traced back to July 1973, when the Department of the Army accepted an invitation from the Commandant of the Marine Corps to participate in the Position Location Reporting System Program. The Army initiated the Army Data Distribution Program as the Position Location Reporting System (PLRS) and Joint Tactical Information Distribution System (JTIDS) Hybrid Program in 1979. The PLRS and JTIDS Hybrid Required Operational Capability document, dated October 1986, contains the original requirements for EPLRS.

PLRS OT III was conducted in 1988, with many problems identified. Solutions were implemented and verified, and a full-scale production was awarded in time to equip Marine Corps forces participating in the Persian Gulf War. Although reference position limitations were revealed when survey teams had difficulty keeping up with the rapid rate of advance into Kuwait, the Marine Corps reported PLRS as having significantly enhanced their Gulf War performance in both situational awareness and free-text communications. EPLRS completed IOT&E II in December 1996. The purpose of IOT&E II was to determine the operational effectiveness and suitability of the downsized EPLRS NCS and EPLRS SIP radio.

From February 1996-March 1997, EPLRS (Tactical Internet) testing was conducted at the Electronic Proving Ground and Ft. Hood, TX, in conjunction with the Task Force XXI Advanced Warfighting Experiment. Although the level of digital connectivity observed during this experiment was low, and judged not suitable for tactical operations, the effort contributed significantly to the re-design of the Tactical Internet Architecture that will be employed on the Digital Battlefield.

EPLRS, in its role as a key component of the Tactical Internet, participated in the Force XXI Battle Command, Brigade and Below (FBCB2) Development Test-1 in May 1998 at the Electronic

Proving Ground, and the FBCB2 Limited User Test (LUT)-1 at Ft. Hood, TX, in August 1998. The Development Test-1 employed 47 EPLRS radios and included barrage and localized jamming.

TEST & EVALUATION ACTIVITY

All test and evaluation activities involving the EPLRS radio during this reporting period were within the framework of the Tactical Internet and completely aligned with the FBCB2 Program. The FBCB2 Limited User Test-2 originally scheduled for April 2000 was downgraded to a Customer Test, and LUT-2 has yet to be rescheduled.

TEST & EVALUATION ASSESSMENT

The data from IOT&E II and the previous operational tests for EPLRS were sufficient to conclude that the current version of EPLRS, the downsized NCS, and the SIP radio effectively disseminate short data messages such as those used in the air defense application. The data were not sufficient to demonstrate effectiveness for long messages. Results from Army Tactical Command and Control System testing indicate that approximately fifteen percent of its traffic included messages longer than those examined during IOT&E. While the jamming environment did reduce the message completion rate, the system performed well overall. IOT&E II also provided sufficient data to confirm that EPLRS is operationally suitable. Testing of the new Value Engineering Change Proposal radio should include longer messages at higher data rates with interoperable host systems.

In its Tactical Internet role, and in conjunction with the Single Channel Ground and Airborne Radio System radio and Internet Controller, the data collected during the 1997 Force XXI Advanced Warfighting Experiment indicated that the Tactical Internet message completion rate and speed-of-service were below expectations. Development Test-1 results demonstrated significant improvements over experimental results: command and control message completion rates increased from approximately 30 to 80 percent, and speed of service decreased from approximately 3 minutes to less than 4 seconds. Although these results were reflective of performance in a technical environment, similar improvements were also observed during the more operationally realistic LUT-1, albeit with a smaller network than in the Advanced Warfighting Experiment. Whether these results are "scalable" from a battalion task force to a brigade task force was to be examined during the FBCB2 Limited User Test-2/Force Development Test and Experimentation in April 2000. However, due to software development and integration challenges within the Army Battle Command System, this Limited User Test was cancelled and has yet to be rescheduled. An excursion during the Customer Test examined transmission of FBCB2 and air defense data over the same EPLRS needline network, and found that the bandwidth was not sufficient to meet the 4 second update rate for air tracks.

Testing and evaluation from FY01-02 for the FBCB2 Program will determine whether EPLRS can adequately support the Tactical Internet requirements of the Digital Battlefield.